



The Arboretum Bulletin

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Annual Meeting

ONE of the most important events of the year will be the annual meeting of the University of Washington Arboretum to be held at the Olympic Hotel, June 18, at 8 p.m.

Dr. Lee Paul Sieg, president of the University of Washington, will open the meeting. Other speakers for the evening will be Mr. Frank Davison, whose subject will be "What the Arboretum Means to Us"; Mr. Donald G. Graham, president of the Arboretum Foundation will show colored slides of the new hybrid rhododendrons, and Mr. C. B. Hutchins, a bird artist, will give an illustrated lecture on the birds of Washington.

Interest in horticulture has been gaining by leaps and bounds since the turn of the century and people are learning more easily about the choicest plant materials for their own gardens.

The University of Washington Arboretum is the first organization in this part of the country to attempt a complete and systematic gathering together of the best of the world's ornamental trees and shrubs.

The Use of Sphagnum in Plant Propagation

By DUANE O. CRUMMETT

SPHAGNUM MOSS has been extensively used for a number of years in the packing of plants for shipment, but the many other horticultural uses for which it is so admirably suited, have been largely neglected by the amateur and professional gardener. Because of its structure, sphagnum has not only the capacity to absorb larger quantities of water and to retain it over a longer period of time than any other similar material, but it also aids substantially in the proper aeration of the medium to which it is added with resultant improvement in root growth and plant vigor. Until very recently horticultural literature has revealed very few instances in which sphagnum has played any extensive part in routine propagation.

Several workers have recommended dried sphagnum as a covering over soil on which to germinate seed of ericaceous plants and similar types of fine seed. It has also been suggested as a covering agent in the form of dust. Live sphagnum has been used for the germination of orchids and alpines as well as in bog gardens as a growing medium for some orchids and insectivorous plants. It is also well suited for lining hanging baskets and other similar containers.

The three chief purposes for which sphagnum may be most effectively utilized in propagation are: (1) the germination of seed, (2) the rooting of cuttings, and (3) the growing of seedlings and rooted cuttings. The most extensive trials of this material for seed germination have been carried on at the United States Plant Introduction Garden

at Glenn Dale, Maryland, where living sphagnum has been successfully employed for 15 years in germinating about 2,500 species of plants covering a wide taxonomic range with complete control of damping-off in all cases. Since the latter condition is generally the greatest deterring factor to the successful production and growth of seedlings and since live sphagnum is not universally available, a simpler method (recently published) for complete control of damping-off should command careful attention. This method was reported by staff members of the above-mentioned station to the American Society of Horticultural Science, a summary of which appeared in the April, 1941, issue of *The National Horticultural Magazine*.

In the most outstanding test reported, flats in a heated greenhouse were filled with soil which was so badly infested with damping-off organisms that two previous sowings on it had been complete failures. The upper quarter-inch layer of soil from one-half of each flat was removed and replaced by a layer of dry commercial sphagnum of identical thickness. Seeds of petunia, snapdragon, forget-me-not and exacum were sown broadcast in equal quantities on each half of the flats. Similar sowings were made on flats in which a three-fourths of an inch layer of sphagnum replaced the upper layer of soil in half of these flats. Germination results were slightly better on the sphagnum than on soil. After 45 days an appreciable number of seedlings in the soil, half of the flats of the first three named species, had damping-off and practically all seedlings of exacum had been destroyed. However, not a single loss occurred on the sphagnum. In several cases damping-off continued in the soil areas until it reached the sphagnum where it became completely arrested. No significant difference resulted from the use of the two thicknesses of sphagnum.

In another test, seed of 40 species of plants were sown on a half-inch layer of sphagnum over unsterilized garden soil in flats, placed in an unheated greenhouse in April where extremes of heat and cold were encountered. In previous years such conditions so conducive to damping-off had resulted in a high percentage of loss with the same soil. However, on the sphagnum in this case no such destruction occurred except in one instance, which was negligible.

Similar tests were conducted on infected soil in outdoor frames during July and August, using 12 species planted in duplicate in randomized bands on a three-fourths of an inch layer of sphagnum over soil as compared to soil alone. Unusually high temperatures prevailed during part of the test. Results in this case were similarly impressive; the superiority of the sphagnum plots being that between successful germination and virtual failure.

The dry commercial sphagnum used in these tests was prepared by rubbing through a hardware cloth of three meshes to the inch. It was then added to the flats or frames,

leveled, firmed and well watered, either before or after sowing. A second watering 24 hours later insured adequate wetting of the sphagnum without any danger of over-watering. Seed was broadcast upon the surface and usually not covered unless of fairly large size in which case sphagnum was the agent used. The flats or frames were then covered with glass and protected from direct sunlight by shading. After the seeds germinated and the seedlings had developed to some extent, air was admitted gradually. Generally no watering was required until several days after germination.

Other tests gave similar good results with such common garden plants as columbine, delphinium, pansy, azalea, zinnia, tomato, celery and cabbage. In all tests stronger seedlings and better growth occurred where a solution of one teaspoon each of potassium nitrate and commercial super-phosphate to each gallon of water was used for the initial and occasional subsequent waterings of the sphagnum layer. In addition to this demonstrated advantage of the use of sphagnum for the control of damping-off, which obviates the expense of soil sterilization and the trouble and uncertainty of chemical treatments in seedling culture, this medium permits great latitude in watering, retains an optimum and constant moisture content conducive to good germination and facilitates the ready removal of small or large seedlings in transplanting with minimum injury to the roots.

These advantages for seed germination have been demonstrated recently at the Arboretum where sphagnum has proven superior to 21 other mixtures in the percentage of germination and control of damping-off with seed of four species of rhododendron.

Sphagnum is also useful in planting seed with which one may be unfamiliar. In case germination does not occur within a reasonable length of time, recovery of the seed for examination and stratification or other stimulative treatment can be readily effected. In this connection, it is also an ideal medium in which to place seed for stratification either out-of-doors or in a refrigerator. In the latter instance the unexcelled capacity of this moss to absorb and retain moisture offsets the tendency of the refrigerator to remove the moisture from the stratified seed packages which so often happens with disastrous consequences when other media are used.

Sphagnum also finds a ready use in the propagation of plants by cuttings. Not only is it an admirable material for packing cuttings when they are to be transported any distance or held on hand for any length of time, but it may also serve advantageously as a rooting medium. Good results have been obtained with the use of sphagnum and sand in the rooting of cuttings and it is quite likely that this substance can be profitably used alone or with other media with equally good results. Reports on the outcome of such tests now in progress at the Arboretum will reveal more definite information on this phase of sphagnum utilization.

Air layering is a method of propagation that is occasionally employed for certain types of plants. Whenever this method is used, sphagnum is the best material for this purpose.

Sphagnum has been successfully employed by several workers as a growing medium in experimental nutrient culture. It is also suitable, when mixed with equal quantities of sand, as a medium in which rooted cuttings or seedlings may be grown. In preliminary tests conducted during the winter at the Arboretum this medium, in comparison with

nine other growing mixtures, has given excellent results in the growth of rooted cuttings of seven varieties of heather, with occasional applications of nutrient solutions. Further work is now in process to test the practicability of this mixture and others containing sphagnum in the growing of rhododendron and other types of seedlings as well as rooted cuttings of a variety of plants.

It is, therefore, seen that sphagnum moss can be applied to a wide variety of uses in propagation. Considered from the standpoint alone of the simplicity of its demonstrated ability to effectively control damping-off, it seems that anyone contemplating limited or extensive propagation activities should be well compensated by giving this material a trial for this one reason alone without considering its many other uses.

A Spray Schedule for Common Garden Insects and Diseases

HERE came to us today an interesting bulletin entitled "Control Measures for Insects and Diseases Attacking Ornamental Nursery Stock," by E. P. Breakey, entomologist, and G. A. Huber, plant pathologist, Western Washington Experiment Station, Puyallup, Wash. It is also known as Circular No. 93 of the State College of Washington, Pullman, Washington. To quote the author's words, "The purpose of this circular is to make available the control measures of the more important insect pests and diseases of nursery stock. A general spray can be applied to all nursery stock in the spring before growth begins, using 2 per cent oil emulsion with nicotine sulphate (1-800). This will control eggs of leaf rollers, eggs of mites and other insect eggs."

"The insects that attack ornamental plants, and others, can be divided into two general classes according to their feeding habits, namely (1) those that have biting mouth parts and feed by consuming parts of the plant, such as leaves, or portions of them; and (2) those that have sucking mouth parts and feed by piercing the tissues with their "beaks" and drawing away the plant juices. The use of a poisonous substance on the plant in such a manner that it will be eaten along with the parts being consumed as food by those insects with biting mouth parts suggests itself at once as a means for bringing about their extermination. The well-known arsenical sprays and their substitutes have been developed to supply this need. It sometimes happens, however, that there are objections to the use of these materials, in which case the insect must be attacked from a different angle. The feeding habits of those insects belonging to the second group eliminate the possibility of poisoning them in this manner. As a consequence, there has been developed a class of insecticides which kill by contact. The well-known nicotine sprays belong to this group as do the oils of those based on Pyrethrum extractives. In order to obtain satisfactory results from the use of these, they must be applied in such a manner that the insects actually come in contact with the spray.

"It might also be well to emphasize the need for suitable equipment and the proper timing of the various sprays indicated for those who are inexperienced. Some sort of power sprayer would seem to be indispensable. Whatever the equipment available, it should be put in readiness before the season starts, for a delay caused by faulty equipment may be the difference between failure and success."

An examination of the methods that are recommended in the pamphlet for the control of the numerous insects and diseases that attack ornamental plants reveals that it requires only a relatively small number of basic insecticides

and fungicides to combat the majority of them. Furthermore, it is also revealed that the same toxic substance, if applied during certain periods, will suffice for several insect pests and diseases. The purpose of this article is to present an abbreviated compilation of the suggested controls so that the gardener may have a better understanding of the types of sprays or dusts to be used at different periods during the season for specific pests.

In the first paragraph above these authors suggest that a general spray using 2 per cent oil emulsion with nicotine sulphate (1-800) "can be applied to all nursery stock in the spring before growth begins." You, as either an amateur or professional grower, should derive the following meaning from the statement: (1) that you could use the spray to advantage on your ornamental trees and shrubs, (2) that a 2 per cent oil emulsion can be made by mixing 15 teaspoonfuls of the oil per gallon of water and (3) that the 1-800 concentration of nicotine sulphate can be procured by adding one teaspoonful to each gallon.

With this spray you should be successful in combating the following pests if the application is made at the proper time.

Aphis (plant lice): Apply "as soon as the first individuals appear."

Cypress webber: Apply "following the first period of warm weather in the spring."

Cypress tipmoth: Apply "as soon as eggs are laid, usually about May 15. Repeat two weeks later, and at monthly intervals to October."

Chermes: "Minute, whitish scale-like insects. Spray—as soon as the infestation is noticed in the spring."

Holly Bud Moth: Apply "just before the buds start to open, late in April, to kill the over-wintering eggs on the under side of the leaves. This spray should also control the scale insects which infest hollies."

Holly scales: Apply "during April."

Scale insects: "Oyster Shell, San Jose, Scurfy Scale, etc.; apply early in the spring before growth begins."

Sitka spruce gall: Apply "just before growth starts in the spring."

Rhododendron lacebug: Apply "as soon as the nymphs appear in May. Repeat the application if the infestation persists."

Rhododendron white fly: "Control same as for the Rhododendron lacebug."

Remember, all these pests can be controlled by using the nicotine sulphate oil emulsion spray. Also please note how many of the application dates are included in the relatively short period from "just before growth begins" to the end of May.

The next most generally effective insect spray is lead arsenate. This is used for the chewing types in the concentrations suggested below:

Cotoneaster webworm: Two pounds of lead arsenate per 100 gallons of water "as soon as the first evidence of insects is noted."

Cherry and pear slug: "Small fleshy, dark-green to orange, slug-like, slime-covered larvae up to one-half inch in length, feeding on the surface of the leaves which they skeletonize. Spray with lead arsenate, two pounds to 100 gallons."

Holly leaf miner: "Apply a cover spray of lead arsenate, about two and one-half pounds per 100 gallons (of water) as soon as the flies appear. Repeat often enough to maintain protection through the month of May, or as long as flies are about." The adults are "small midges or gnat-like flies."

Lilac leaf miner: "Apply a lead arsenate spray early in May to kill the larvae before they enter the leaves and

repeat as for codling moth since there are several generations a year."

Satin moth: "Rather large black-bodied caterpillars with whitish markings on the sides of the back and a nearly square patch of white hairs on the middle of each segment of the back. Spray with lead arsenate, three pounds to 100 gallons of water."

Gardeners should note that most of these chewing insects appear after the leaves are formed. You should expect them at any time during the spring and summer and be prepared to spray as soon as they develop.

Translating the above lead arsenate concentrations into terms that are usable to the average gardener we have:

2 lbs. per 100 gallons = 1 oz. per 3 gallons.

3 lbs. per 100 gallons = 1½ oz. per 3 gallons.

(To be continued)

Bamboos

By NORRIS B. STONE

(Practical Gardener, Volume III, Number 5, May, 1941)

IT IS NOT generally known that bamboos are potential crops well suited to our Pacific Northwest. Bamboos are of the grass family, numbering about 500 species, of which two are indigenous to the United States, being the canebrakes of the southern states. Of these 500 species there are, like other grasses, species that like swampy conditions and others that do well where you would expect a good crop of wheat or corn. Some grow in clumps while others are of rambling habit. Their height averages from 1½ to 125 feet tall. This latter giant grows only in India, Ceylon and adjacent areas. Several species of the rambling or hardy running bamboo do very well in this locality and will stay evergreen down to as low as five degrees below zero.

The United States government is very much interested in more extensive propagation of bamboos because of their very practical uses which fall into three main groups: (1) Domestic purposes around the farm and home; (2) commercial production; (3) ornamentation. One of the hardy running species, the Giant Timber Bamboo of China and Japan (*Phyllostachys Bambusoides*) of which there are several fine groves within a few miles of Portland, covers the first two of these three groups. Government pamphlets list some 30 uses. One of these is salads made from the new crisp shoots. Another is material for manufacture of paper, of which 40 to 50 tons per acre can be grown.

Being grasses, bamboos make their entire growth in about six weeks. The Giant Timber one, which, at its optimum, sends up shoots 6 inches in diameter and 70 feet tall, fairly jumps out of the ground. A record from a grove near Portland of a 3½-inch shoot is a growth of 36 inches in 24 hours, the mature shoot measuring 40 feet tall. The shoots are ripe in three years and stay unchanged for 12 to 15 years, when they are cut out, being already replaced with later grown ones. The root system of bamboos is an interlocking rhizome system, being a food storage. As this root system enlarges in size the corresponding leaf surface becomes greater to manufacture growth food. The new shoots which usually come up each May are larger until the optimum of the particular species is reached.

The government has two bamboo farms—Savannah, Ga., and Chico, Calif. Anyone who has room for a grove one-eighth to one acre in size will be furnished starts by them for the cost of expressage. Mr. R. A. Young, associate horticulturist, Bureau of Plant Exploration and Introduction, Washington, D. C., is in charge. Interested readers should also write to the Department of Agriculture, Washington, D. C., for pamphlets and growing instructions.

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